Castor Bay to Dungannon Strategic Trunk Mains

£20.3 million investment to improve the water infrastructure in South Tyrone, Northern Ireland

by Jonathan Wilson (CEng MIEI) & Damien McKeown (CEng MIEI)

In order to comply with the EC directives on drinking water quality, NI Water were required to procure infrastructure to facilitate the decommissioning of those water sources which were identified as non-compliant. Keeping these sources in service after the expiry of the Authorised Departure date of 24th December 2009 may have lead to EC fines, Drinking Water Inspectorate (DWI) Enforcement Orders and adverse publicity due to missing regulator key outputs on water quality, pressure, interruptions and restrictions on the use of water.

Directionally drilled crossing of the River Bann & Dublin railway - Courtesy of NI Water and Capita Symonds

Background

Conceived within the 2002-2007 Water Resource Strategy for Northern Ireland, the key driver for the Castor Bay to Dungannon Strategic Trunk Mains Project was the removal of water sources in the Dungannon Resource Zone deemed non-compliant in relation to EC Drinking Water directives, namely Altmore Water Treatment Works (WTW) and the borewells at Gortlenaghan and Shanmoy. Furthermore this gave NI Water the opportunity to review the infrastructure in the area and ensure it was sufficient to meet future needs.

Zonal studies

The Dungannon Resource Zone (RZ) comprised of the areas served by Altmore WTW, Gortlenaghan Borewell (BW) and Shanmoy BW. A detailed zonal study (DZS) was undertaken by Faber Maunsell (formerly Mulholland & Doherty) and identified the future demand based on population and industrial growth, increases in per capita consumption and projections in progressive leakage reduction.

NI Water, in consultation with project managers Capita Symonds identified that the required infrastructure capacity for the Dungannon RZ was 30Ml/d, inclusive of peak demands and headroom, to be delivered over 24 hours.

The DZS identified Mullaghanagh Service Reservoir (SR) and Carland SR as the key delivery points on the eastern boundary of the RZ, and with the transfer of treated water from Carland SR to existing service reservoirs in the north and west of the Dungannon RZ this would allow the decommissioning of the non-compliant sources.

Existing trunk main assessment

Assessment of the existing trunk main between Ballydougan SR and Moy Water Pumping Station (WPS) determined that only 10.8Ml/d could be delivered to Moy WPS during future peak demand conditions after the offtakes between Ballydougan SR and Moy WPS were served.

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DAWSON-WAM successfully delivered the Castor Bay to Dungannon Strategic Trunk Main on behalf of Northern Ireland Water

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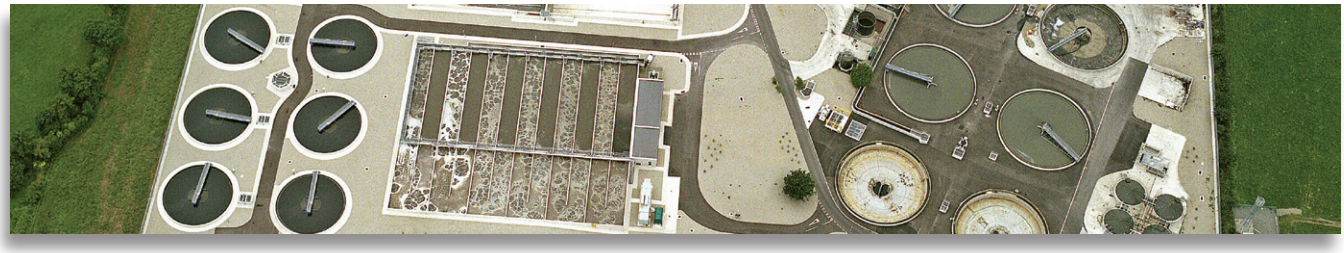

Head office: 028 9081 3105
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Northern England: 0161 935 8195
Scotland: 0131 200 6270
Wales: 029 2064 7384

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W: www.dawsonwam.co.uk

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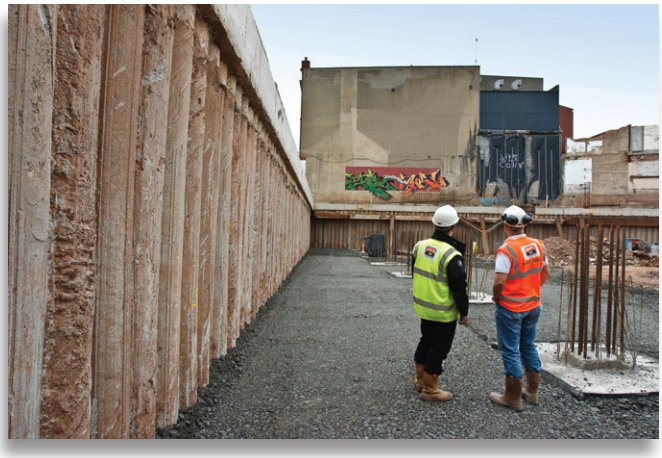

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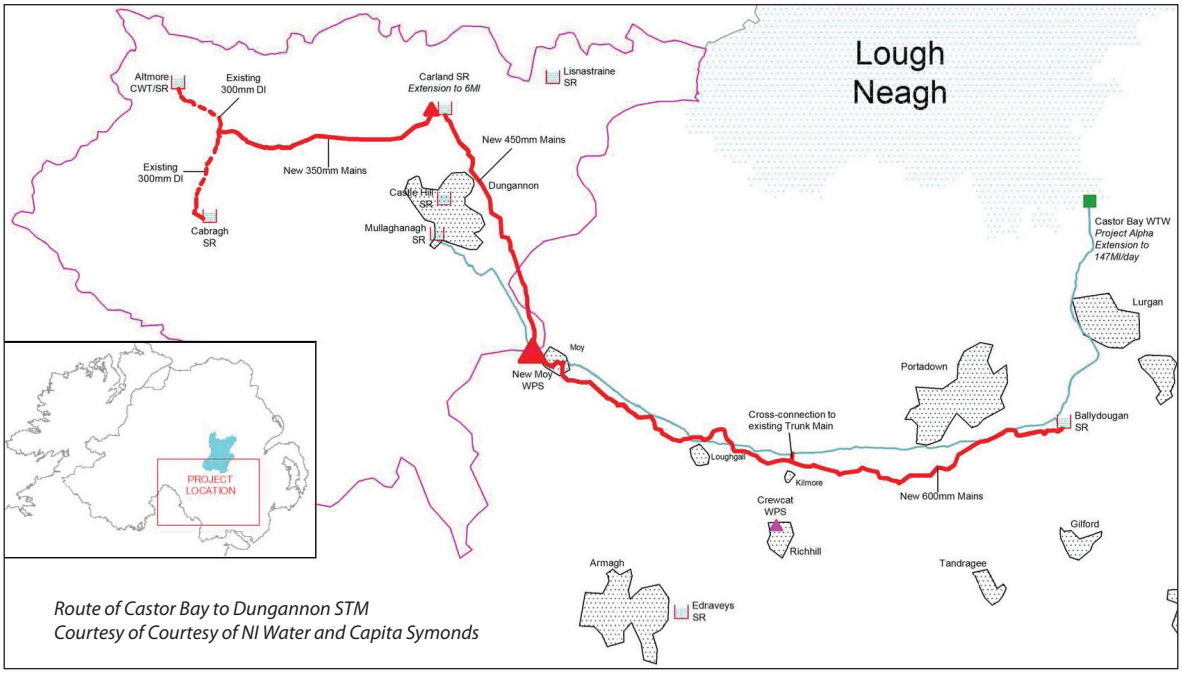


Route of Castor Bay to Dungannon STM
Courtesy of Courtesy of NI Water and Capita Symonds

Furthermore the existing plant within the WPS at Moy had reached the end of its serviceable life and would not have the capacity to deliver the 30Ml/d design demand into the RZ.

Scope evolution

Working in conjunction with NI Water and their Zonal Study teams, Capita Symonds evolved the scope that would allow Altmore Water Treatment Works and a number of borewell sites in the Dungannon area to be taken out of service. The final scope was as follows:

- 51km of trunk mains ranging from 400mm to 800mm in diameter from Lurgan, Co. Armagh to Cappagh, Co. Tyrone.
- 35km being laid cross country and the remaining 16km laid in carriageway.
- A new 30Ml/d water pumping station in Moy, to replace the existing WPS.
- A new 6.4Ml service reservoir at Carland, between Dungannon and Cookstown.
- A new 7.2Ml/d WPS at Carland to deliver supply to downstream service reservoirs.
- A new chlorination strategy to provide secondary dosing at Carland SR.
- Demolition of the Altmore WTW and the existing 0.5Ml Carland SR.

Procurement

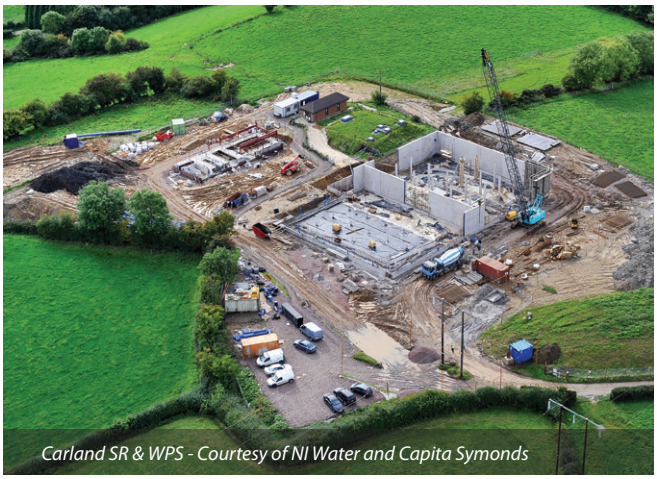
The project was awarded in September 2009 under a NEC ECC Option A form of contract to BWW Water as a Design & Build project. BWW Water was formed as a joint venture between Dawson WAM and BSG Civil Engineering. Civil and Structural design services were provided to BWW Water by WDR & RT Taggart with M&E services being provided by Williams Industrial Services.

With Project Management, M&E and CDM Coordination services being provided by Capita Symonds along with NIW Civil Supervisory staff, the contract team set up hub office in Moygashel, Dungannon.

Managing the contract

With a project of this nature there are a number of risks that required special attentions and with a large diameter trunk main being laid across vast areas to private property it was most important to focus sufficient resources on managing the landowners expectations while ensuring that the impact was kept to a minimum on the day to day running of landowner's business. To this end a land liaison officer was employed full-time to act as the mediator for the landowners, their agents, the contractor, and the project managers and for NI Water. His roles included pre-entry surveys with the landowners, inspection of land drainage and reinstatement as well as providing information that would set the compensation value for the disruption caused.

Capita Symonds worked alongside BWW Water in delivering the main contract in a professional and timely manner. The early warning notices and compensation events were managed in line with the NEC CoC and cost analysis of their effect on the out-


Carland SR & WPS - Courtesy of NI Water and Capita Symonds


250 tonne drilling rig - Courtesy of NI Water and Capita Symonds

turn cost were relayed to NI Water to ensure budget profiles were accurate and that the funding was in place to ensure payment was made within the allocated time.

Construction challenges

The contract team faced many challenges during project delivery:

- Wettest November on record (2009) with 172mm of rainfall recorded at the nearby Armagh weather station, severely impinging on the planned cross-country pipe laying works.
- Coldest December for 100 years (2010) during which it made it near on impossible to carry out water mains pressure testing and commissioning of the works.
- Concrete pours and roof testing were delayed for approximately 6 weeks at Carland SR due to the aforementioned low temperatures.
- The single shot directional drill operation of 1.0km of twin 710mm OD polyethylene pipe strings under the River Bann, River Cusher, Newry Canal and Portadown to Dublin Railway Line using a 250 tonne rig.
- Directionally drilling twin large diameter pipework under the M1 Motorway and River Blackwater.
- Integration of the new infrastructure alongside existing with negligible interruption to consumers.

Project outcomes

Phased commissioning of the project elements began in February and continued until April 2011, providing tangible benefits to NI Water Networks and Operations immediately.

The new trunk mains, working in parallel with existing infrastructure, boosted pressure within the Dungannon network.

The new water pumping stations have provided economic efficiencies by increasing throughput, thus reducing power costs and increasing recovery time within the water main network.

Increased water storage at Carland Service Reservoir has improved the operation of the distribution network within the Dungannon area. Furthermore the removal of the non-compliant sources has improved water quality throughout the Dungannon Resource Zone and demonstrated Northern Ireland Water's commitment to regulatory and legislative drivers.

The editor & publishers would like to thank Jonathan Wilson, Senior Project Manager with Capita Symonds & Damien McKeown Senior Capital Project Manager with NI Water, for providing the above article for publication.


250 tonne drilling rig - Courtesy of NI Water and Capita Symonds